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EXAMINER
CHU, DAVID H

ART UNIT	PAPER NUMBER
2628	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 May 2007*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 May 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☒ All   b)☐ Some * c)☐ None of:

   1.☒ Certified copies of the priority documents have been received.

   2.☐ Certified copies of the priority documents have been received in Application No. _____.

   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
   Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1.   **Claim 4 is objected to because of the following informalities:**

-   The limitation "surrounding regions" lack antecedent basis. The Examiner

    believes the Applicant intended claim 4 to be dependent on claim 3.

    Appropriate correction is required

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

3.   **Claims 7-10 are rejected under 35 U.S.C. 112, second paragraph, as being**

indefinite for failing to particularly point out and distinctly claim the subject

matter which applicant regards as the invention.

-   Claim 7 is not clear if it is claiming an apparatus or a method. It is not proper

    to claim both in the same claim

4.   **Claims 9 and 10 are rejected under 35 U.S.C. 112, second paragraph, as**

being indefinite for failing to particularly point out and distinctly claim the subject

matter which applicant regards as the invention.

-   The limitation is not clear of how many acquisition units are being claimed

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5.   **Claim 11 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.**

The claim recites a computer program per se. Computer programs per se, not stored on a computer readable medium, are abstract ideas. Computer programs per se are not capable of performing any function (See MPEP 2106).

It is suggested that the preamble be amended to recite, "A computer readable media having stored thereon a computer program product that is executed by the computer for..."

Claim Rejections - 35 USC § 102

6.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7.   **Claims 1-7 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated**

by Shen et al. ("Differential Volume Rendering: A Fast Volume Visualization

Technique for Flow Animation").

8.   <u>Note with respect to claim 1</u>,

Shen et al. teaches:

- a) Determining the volume values of a first volume image which are relevant

  for the visualization from the volume values of said volume image

  [*Shen et al. teaches an efficient volume rendering method by utilizing a differential file*

  *("**relevant volume values**") that that contains the data paths of only the changed elements.*

  *The differential file contains 3D positions ("**volume values**") and values of the changed data*

  *elements at each time step (each time step comprise of the "**first and second volume**

  image").]

  (Shen et al., pg. 181-182: "Differential Volume Rendering" "Visualization Pipeline")

- b) Storing the voxels with which these volume values are associated

  [*Refer to above. The voxel is the "**associated volume value**"*]

- c) Deriving a two-dimensional image from the volume image

    [*As discussed above, Shen et al. teaches differential volume rendering (2D projection of a 3D discretely sampled data set)*]

- d) Determining the volume values of a second volume image which are relevant for the visualization from those of its volume values which are associated with stored voxels or with voxels neighboring said stored voxels

    [*As discussed above, Shen et al. teaches using only the information needed (**"determined relevant volume values"**) for the rendering process, wherein the volume data at each time step can be discarded (volume data (**"stored voxels"**) other than those of the differential file need only to be used once). Note further, Shen et al. teaches a Discrete Rays and Zero-Order Interpolation method as one of the many interpolation and ray sampling methods used for the ray casting algorithm, wherein 4 surrounding pixels (**"neighboring voxels"**) are selected to cast new rays*]

    (Shen et al., pg. 182-183: "Pixel Positions Calculation")

- e) Storing the voxels with which these volume values are associated

    [*Refer to above.*]

- f) Deriving a two-dimensional image from the volume image

    [*Refer to above. Volume rendering is a step of creating 2D images of a 3D object*]

- g) Repeating the steps d) to f) for any further volume images

    [*Shen et al. teaches that the volume rendering process consist of a series of volume rendered images at different time steps*]

    (Shen et al., pg. 181, line 3-16: "Introduction")

9. <u>Note with respect to claim 2</u>,

Shen et al. teaches:

A method as claimed in claim 1, in which,

- The neighboring voxels are defined by a motion model of the object motion

  [*As discussed above the ray casting method are able to cast rays along a path (one of the methods being defined by 4 surrounding voxels) corresponding only to changed data elements. Such tracking (generating a the differential file discussed above) of only the changed data elements defines a "motion model" of the change in object ("object motion")*]

10. <u>Note with respect to claim 3</u>,

Shen et al. teaches:

A method as claimed in claim 1, in which,

- All voxels from surrounding regions around stored voxels are defined as neighboring voxels

  [*The voxels that fall within the range onto which the rays is cast, out of the different interpolation and ray sampling methods taught by Shen et al., defines the range of the "surrounding/neighboring voxels" vary*]

11. <u>Note with respect to claim 4</u>,

Shen et al. teaches:

A method as claimed in claim 1, in which,

- The shape and/or the magnitude of the surrounding regions can be adjusted

  [*Depending on the interpolation and ray sampling methods taught by Shen et al., the area range through which the ray is cast varies*]

12. <u>Note with respect to claim 5,</u>

Shen et al. teaches:

A method as claimed in claim 3, in which,

- A surrounding region contains all voxels which are situated no further than a given geometrical distance from a stored voxel

  [*The threshold defined by the different interpolation and ray sampling methods taught by Shen et al. defines the "**geometrical distance from a stored voxel**" (changing point of stored in the differential file discussed above)*]

13. <u>Note with respect to claim 6,</u>

Shen et al. teaches:

A method as claimed in claim 1, in which,

- The voxels of a volume image are combined in blocks for storage, a block being stored when the volume value of at least one voxel in a block is

relevant for the visualization, the visualization of a second volume image

being derived from those of its volume values which are associated with

voxels in stored blocks or in blocks neighboring such stored blocks

[*The only information need for the rendering process (points stored in the differential file)*

discussed above, is the ***"blocks for storage"*** *that is utilized in the visualization of the all*

volume data]

14.   Note with respect to claim 7, claim 7 is similar in scope to the claim 1, thus the

rejections to claim 1 hereinabove are also applicable to claim 7.

Note further, Shen et al. teaches:

An image processing unit for visualizing a sequence of volume images, which

unit comprising:

- ▪   a) A data input for volume images

   [*The object to be visualized by the visualization method of Shen et al. is the* ***"data input"***]

- ▪   b) A memory for storing voxels

   [*Shen et al. teaches a differential volume rendering method for efficient use of disk space.*

   Therefore, the voxels are inherently stored in a type of ***"memory"***]

- ▪   c) A data processing unit for determining the volume values of a volume

   image which are relevant for the visualization

   [*Shen et al teaches achieving considerable disk-space saving and near real-time rendering*

*on a single processor workstation (**"data processing unit"**)*]

(Shen et al., "Abstract")

- d) A visualization unit for carrying out visualization methods

  [*single processor workstation inherently comprise of a display unit*]

- e) A control unit for controlling said components in such a manner that a

  method as disclosed in claim 1

  [*The single processor workstation discussed above*]

15. <u>Note with respect to claim 11</u>,

Shen et al. teaches:

A computer program or computer program product which enables,

- A programmable data processing unit to carry out a method as claimed in

  claim 1

  [*The single processor workstation discussed above*]

Claim Rejections - 35 USC § 103

16.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of
the claims under 35 U.S.C. 103(a), the examiner presumes that the subject
matter of the various claims was commonly owned at the time any inventions
covered therein were made absent any evidence to the contrary. Applicant is
advised of the obligation under 37 CFR 1.56 to point out the inventor and
invention dates of each claim that was not commonly owned at the time a later
invention was made in order for the examiner to consider the applicability of 35
U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35
U.S.C. 103(a).

17.   **Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable**

over Shen et al. as applied to claims 1-7 and 11 above, and further in view of

Brandl et al. (U.S. Patent No. 6450962).

18.   <u>Note with respect to claims 8 and 9,</u>

Brandl et al. teaches:

An ultrasound apparatus as claimed in claim 8, comprising,

- An acquisition unit in the form of a sonography applicator

  (Brandl et al., col. 5, line 42-51)

Therefore, at the time of the invention, it would have been obvious to one of an ordinary skill in the art to use the sonography teaching of Brandl et al. to acquire the image data, because sonography is a well known method in the art as supported by reference Brandl et al., and such combination of teachings yield predictable results.

19.   Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shen et al. as applied to claims 1-7 and 11 above, and further in view of Goto (PGPUB Document No. US 2004/0075658).

20.   Note with respect to claim 10,

Goto teaches:

A CT apparatus as claimed in claim 8, comprising,

- An acquisition unit in the form of an X-ray source and an X-ray detector unit [Goto, 0021]

Therefore, at the time of the invention, it would have been obvious to one of an ordinary skill in the art to use the X-ray teaching of Goto to acquire the image data, because sonography is a well known method in the art as supported by reference Brandl et al., and such combination of teachings yield predictable results.
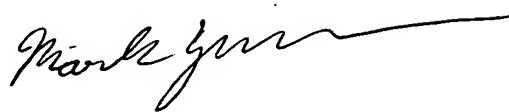
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David H. Chu whose telephone number is (571) 272-8079. The examiner can normally be reached on M-F 9:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark k. Zimmerman can be reached on (571) 272-7653. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DHC

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